

CONTRIBUTION TO OUR KNOWLEDGE OF AUSTRALIAN *HIRUDINEA*. PART iv.

WITH A NOTE ON A PARASITIC ENTOPROCTOUS POLYZOON.

BY E. J. GODDARD, B.A., B.Sc., LINNEAN MACLEAY FELLOW OF THE SOCIETY IN ZOOLOGY.

(Plates lvi.-lviii.)

PONTOBDELLA MACROTHELA Schmarda(1861). (Plate lvi.)

For a specimen of this species, I am indebted to Mr. Ogilby, Naturalist to the Amateur Fishermen's Association, Brisbane, who obtained it in the Brisbane River. This constitutes the first record of the species, I think, in Australian waters. The specimen resembles exactly that described by Schmarda from Kingston, Jamaica. I have taken the opportunity of re-examining the species externally, as I am not aware that it has been done since Schmarda's observations on it were made, especially as it is of some interest in regard to metamerism.

The measurements in the specimen preserved in alcohol were—length, 80 mm.; breadth, 10 mm.; depth, 5 mm.

Body.—Colouration a light yellow-brown; no traces of any other pigment in the form of stripes or dots.

The surface is exceedingly rough, owing to its being cut up into a number of tubercular areas, those on the middle annulus of each somite being enormously developed, and probably of greater importance, as regards size, than in any other member of the *Hirudinea*.

The body is readily divisible into "neck-" and trunk-regions. Along the trunk-region, in the mid-dorsal line, runs a longitudinal groove, extending from the anterior extremity of that region through the greater part of the body, towards the posterior extremity.

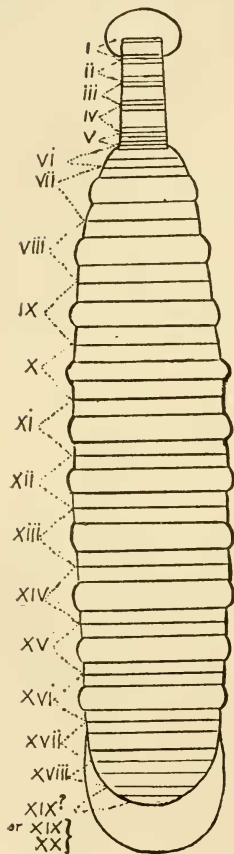


Fig. 1.—Diagram of *Pontobdella macrothela*, shewing somitic constitution.

Annuli.—Total number visible on dorsal surface is 55. Of these 16 fall in the neck-region, and 39 in the trunk-region. The annuli are very readily made out with the naked eye, except at the anterior and posterior extremities, where the lines of division are not clearly marked. However, even in these regions, one can count them definitely.

Throughout the greater part of the body the limits of the somites can be seen, each consisting of three annuli, the middle one of which is about double the width of that anterior and posterior to it. The surface of each of the smaller annuli is divided dorsally into eight tubercular areas, four on either side of the mid-line; similarly on the ventral surface where, however, the tubercles are not so pronounced as on the upper surface. The middle annulus of each somite is divided dorsally into six tubercular areas; two very large tubercles on either side of the mid-line, between each of which two is a minute tubercle; ventrally this annulus is also divided into six areas, the two of which lying next the mid-line are not so pronounced as those lying to the outside of them.

In the neck-region the tubercles are well developed (although not so strongly as in the trunk-portion), so that the somites can

be readily made out in this region. The last five annuli of the neck are constituted by the last annulus of somite iv. of that region, as made out by noting the annuli visible, three annuli of somite v., and the first annulus of somite vi., which is the most anterior somite of the trunk-region. The middle annulus of somite v. differs in no way, as regards the tubercles, from that anterior or posterior to it.

Somites.—As has been already stated, the somite is triannulate; and the somites can be readily made out, owing to the fact that between any two adjacent small annuli runs a strong transverse sulcus, and this occurs regularly throughout the body. One can safely conclude that this marks off the limits of the somites, and, in accordance with this, the large annuli, provided with their prominent tubercles, constitute the middle and second annulus of a somite. These tubercles correspond to the more typical papillæ in other species of *Pontobdella*, and have the same metameric significance. This, then, is in keeping with Castle's generalisation, that the annulus bearing sensory papillæ constitutes the middle annulus of a somite. There can be no doubt that, in this species, such is proved to be the case; but, as will be shown later, this does not hold in all members of the *Hirudinæa*, the sensory annulus really denoting the most anterior of each somite, as suggested by Whitman, in some forms.

The arrangement of the annuli, with regard to somites, as seen in *P. macrothela*, is as follows:—

	Annuli.	Somite.	Nature.
Neck.	{ 1-15	i.-v.	Triannulate.
	{ 16		
	{ 17	vi.	Triannulate.
	{ 18		
Trunk.	{ 19-51	vii.-xvii.	Triannulate.
	{ 52, 53	xviii.	Biannulate.
	{ 54, 55(?)	xix.(?)	Biannulate(?).

From this it will be seen that there is no abbreviation of the somites noticeable at the anterior extremity; and that abbreviation is noticed in somite xviii., where the first annulus is that

bearing the large tubercular areas, and having double the width of that anterior and posterior to it.

PONTOBELLA AUSTRALIENSIS, n.sp. (Plate lvii.)

For the privilege of examining this leech, I am indebted, through Professor Haswell, to Dr. Tidswell. In the collection were about thirteen individuals of the same species, in various conditions of retraction and extension. An examination of these shows how easily mistakes have been made in the creation of new species of this genus, inasmuch as the shape of the body and general habit, and the importance of the papillæ are so different in contracted specimens. In such the otherwise prominent papillæ are hardly noticeable.

In general appearance the species approaches closely to the common European species, *Pontobdella muricata*.

Body.—The shape in various conditions of retraction is shown in Plate lvii.

In an individual with well extended neck the measurements were:—Total length, 20 mm.; neck, 8 mm.(exceedingly slender); breadth of body, 3 mm.; depth of body, 3 mm.

The neck is very strongly attenuated in a state of extension, having a diameter of only 0·5 mm.

Colouration.—In the preserved condition the neck-region is a light yellowish-brown, and the body-region has a blue or bluish-grey colouration. The posterior sucker and the region of a few annuli just anterior to it, have the same light appearance as the neck. No trace of pigmented ornamentation is to be noted in connection with the anterior sucker.

Oral sucker.—Diameter 1 mm. On its margin are borne, on either side of the mid-line, four, sometimes five, pairs of papillæ, the fourth and fifth pairs, that is the posterior two, being usually less strongly developed than the anterior two; and of these, the fourth is larger than the fifth.

On the dorsal surface of the "head," a faint annulation can be made out,

Posterior sucker.—Diameter 1·5 mm. Traces of annuli can be seen on the dorsal surface of this sucker.

Annuli.—Behind the “head,” the body is composed of about 55 annuli. The dorsal surface of the posterior sucker is divided, by two faint lines, into three annuli. The dorsal surface of the anterior sucker is marked off faintly into five or six annuli.

Somites.—Throughout the greater part of the body the somites are triannulate, the middle annulus of each being marked off by the presence of prominent conical papillæ. Beyond this, there are no other means, such as one has in *P. macrothela*, for mapping out the somites, inasmuch as the sensory annulus is not more intimately united with any one annulus than with another, and thus the limits of a somite are not so graphically shown. However, since the sensory annulus is shown to be the middle ring of the somite in *P. macrothela* beyond doubt, and it is hardly probable that one would find the middle annulus to be represented by the sensory ring in one species, and the latter to represent the first annulus in another species of the same genus, we may safely conclude that in this species, as in *P. macrothela*, the sensory ring is the middle annulus of the somite. The middle annulus is also slightly longer than that anterior or posterior to it. All the annuli bear papillæ, but these structures are much more strongly developed in the body-region than in the neck-region.

In the body-region the sensory annulus bears six prominent conical papillæ, one on either side of the mid-dorsal line, one on each dorso-lateral margin, and one on each ventro-lateral margin. In addition to these papillæ, there is a smaller papilla, similar to those in the other annuli, on each side of the median ventral line.

The somitic constitution in regard to the annuli, irrespective of those entering into the “head” and “acetabulum,” is similar to that in *P. macrothela*, the number of annuli being the same in the body of each.

Note on some parasitic bodies found on P. australiensis.

In the present note, I record the occurrence of an unknown Entoproctous Polyzoon, found in abundance, but in an incomplete condition, on *Pontobdella australiensis*.

The structures which I have identified as Entoprocta, have been previously noted but misinterpreted by Macdonald as spermatophores. Macdonald, in a description of some marine leeches from the tropical region of the Pacific, remarks in connection with a large black leech which he found on a species of *Myliobatis*: "Attached to the body in a very irregular manner, but chiefly at its fore part, were several of the double tubular spermatophora shown in fig. 9. These curious bodies I have also found on other marine *Hirudinei*, but always with some characteristic differences. Fig. 6, for example, represents a small black leech with white tubercles, referable, apparently, to the genus *Pontobdella*, found on *Rhinobatis* in the same seas; and fig. 7 is its double-barrelled spermatophore, which is quite different from fig. 9, though obviously of the same nature. Very little is positively known of the generative processes of the marine leeches; but the facts here mentioned may one day meet with a satisfactory explanation."* Macdonald evidently found these structures on *Branchellion* as well as on *Pontobdella*. I have examined both these genera, but have never yet managed to secure specimens on *Branchellion*, although, no doubt, such do exist on the latter genus as on *Pontobdella*, and according to Macdonald's figures, it is quite possible that another species of the genus exists in the Pacific Ocean. I have examined quite a number of specimens of *Pontobdella australiensis*, which is undoubtedly the same species as that examined by Macdonald, and found a large number of structures which apparently are identical with those seen by Macdonald.

On examining specimens of *Pontobdella australiensis*, attention was drawn to a number of slender whitish bodies attached to the anterior region of the body of the leech, and rendered conspicuous by their abundance and colour.

The papillæ in this leech, as noted above, are very prominent structures if the animal is not dilated or extended excessively; and one might, at first, interpret these bodies as abnormally

developed papillæ, the structures themselves being of slightly more importance than the filiform papillæ which occur along the margin of the oral sucker of this species of *Pontobdella*.

Against this idea, was held up the fact that the bodies had no regular arrangement in any one individual. On examination under the microscope, very little assistance can be derived, by means of reflected light, with a view to fixing the exact meaning of these structures. One can readily, however, make out a swollen basal portion measuring 0.1 mm. in diameter, and corresponding to the foot-gland. The structures themselves resemble, in miniature, the leech-host itself in shape, being much attenuated at the distal end, where the calyx would be attached (0.015 mm. in diameter), and thence increasing rapidly towards the proximal end, so that, about mid-length, it measures 0.12 mm. in diameter, and decreases but little till it reaches the foot-gland. The greatest length of any one stalk was 0.72 mm.

No traces of calices were found in connection with any of the stems, and this unfortunate condition prevents one from making any remarks in regard to the generic position of the form. There is, however, every reason to suppose that a new genus is represented by these structures.

Concomitant with the attenuated condition of the distal end of the stalk, is the headless condition of the stalks, so that one may conclude that the calices very readily break away; and, further, that, in all probability, regeneration does not take place. The stem of all Entoproctous Polyzoa has a musculature which is characteristic, so that the difficulty of drawing any definite conclusion of systematic value is enhanced. However, the habitat of the form, and the fact that the form is a solitary species, enable one to conclude, with some reason, that it has some affinity with *Loxosoma*, which is a solitary form, and is found on Annulates, although I can find no mention of its having been found in association with any member of the Hirudinea. In *Loxosoma*, however, the line of demarcation between body and stalk is not well defined, the characters of the genus being given by Hincks as "Polypides pedunculate, solitary, the body closely united to

the stem, and not deciduous." The foot-gland for attachment, rendered necessary by the absence of any adherent stolon, though frequently absent in the adult, is always present in the young, and in the forms under consideration is conspicuously developed as a trumpet-like disc. Judging from the small size of the stalk in all the individuals I have examined, it is very probable that they are all very young.

GEOBDELLA TRISTRIATA, sp. nov.

A specimen of this leech was obtained in the Fife Bay district, British New Guinea; and for permission to examine it, I must express my thanks to Thomas Steel, Esq. In this region it is known to the natives under the name "Domani." I have no further information in regard to its habitat, but consider it quite safe to conclude that it is a land-leech, as in the case of the only two other species which are at present known as representatives of the genus *Geobdella*. Its occurrence in New Guinea is of some interest, inasmuch as the genus is otherwise confined to Australia, *G. Whitmani* being known in New South Wales and Queensland, and *G. australiensis* from New South Wales. As far as I know, *Geobdella* has not been yet found in Victoria or Tasmania. No better place could be found for the requirements for an abundance of land-leeches than moist tropical and sub-tropical spots, and it may be that the genus under description may be confined, more or less, to such localities. I mention this in regard to the limited distribution, because land-leeches are such prominent and easily detected animals, that it is hardly likely that in the well explored Southern State they would escape detection.

The single specimen is preserved in alcohol, and as such in the contracted condition resembles in shape *G. Whitmani* and *G. australiensis*; length, 16 mm; breadth, 4.3 mm; depth, 2mm; posterior sucker, 3mm. in diameter.

Seen with the naked eye, the surface has a papillose, rugose appearance, as is the case in *G. Whitmani*, the only other species I have been enabled to examine. When examined under a lens,

these papillose structures are very marked, giving the surfaces, especially the dorsal, a very marked rugose character. The colouration differs from that in the other species. In the preserved state the ground-colour is light yellowish-brown. On the dorsal surface are two irregularly outlined dark pigment-bands, one on either side of a median clear area, extending from the level of the fourth pair of eyes as far back as the posterior extremity, with slight interruptions at intervals in the posterior third of the body. On the ventral surface are present three straight dark bands, one median and one at either margin of the ventral surface, the former extending practically from the posterior lip of the oral sucker to the posterior extremity, the latter along the posterior two-thirds of the body.

The *oral sucker* is composed by annuli 1, 2, 3, and 4 partly.

The *lower lip* is composed by annuli 4, 5, 6, and 7, if one notes the incomplete annuli on the ventral surface, but really by annuli 4 and 5, the latter composition agreeing with other species of *Geobdella*.

Genital Apertures.—The apertures cannot be made out in the single specimen, owing to the manner in which the ventral surface is buckled, due to contraction.

Annuli.—As in the other species of *Geobdella*, the annuli are 95 in number. On the dorsal surface, the first complete annulus is the fifth(5th), just behind that bearing the fourth pair of eyes, inasmuch as it is the most anterior annulus running to the margin. Annuli 2, 3, 4 are readily made out between the eyes, but can be only faintly made out laterally to the eyes, this being due merely to the fact that the tubercular nature of the rugose surface makes the limits of the annuli fairly readily visible, although marked lines of division cannot be made out so plainly as in the case of succeeding annuli.

On the ventral surface the first complete annulus is the eighth(8th). Annuli 4, 5, 6, and 7 become more and more developed as one passes backwards, so that 7 is more nearly complete than those lying anterior to it.

Somites.—The unabbreviated somite consists of five(5) annuli, a number which is apparently constant in the genus.

There are present no sensillæ in the preserved specimen, so that one has no guide to the metameric constitution of the species from external examination by means of the sense-organs,

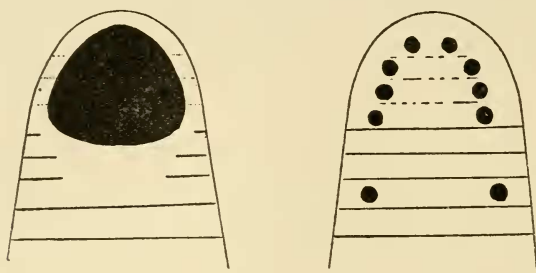


Fig. 2.—Diagrams of anterior extremity of *Geobdella tristriata*, sp. nov.; ventral and dorsal.

except at the anterior extremity, where one can do so where one can draw conclusions from the position of the eyes. However, as the number of annuli is exactly the same in all species of *Geobdella*, one may safely conclude that the somitic constitution of the body is the same in this species as in those in which it can be made out by means of the sensillæ. It is quite possible (and indeed quite likely) that sensillæ are present in the species, and could be made out in a well fixed specimen. Both *G. Whitmani* and *G. australiensis* bear sensillæ.

According to Whitman's method of determining somite-limits, by assuming that the sensillæ denote the first annulus of a true segment, the constitution of the body in which sensillæ can be made out, is as follows:—

Somite i.	Annuli 1.	Constitution	Uniannulate.
„ ii.	„ 2.	„	Uniannulate.
„ iii.	„ 3.	„	Uniannulate.
„ iv.	„ 4,5,6.	„	Triannulate.
„ v.	„ 7,8,9.	„	Triannulate.
„ vi.	„ 10,11,12.	„	Triannulate.
„ vii.-xxii.	„ 13-92.	„	Pentannulate.
„ xxiii.-xxxiv.	„ 93,94,95 + } acetabulum. }	„	Abbreviated.

There is every reason to believe that this same constitution holds in the case of *Geobdella*. Castles, in his excellent work, has laid down the following generalisation in regard to the metameric significance of sensillæ, namely, that the sensory ring occupies the middle of the somite.

In examining the present species for sensillæ, I found, under contraction due to the action of the killing fluid(alcohol), that there were strongly marked divisions regularly arranged, on the ventral surface. In examining these carefully, I found that each division consisted of five(5) annuli, and, by this means, I used a count of the annuli to see how these divisions would correspond with those into which the body would fall by using Whitman's or Castle's method, respectively, in conjunction with the assistance rendered by an examination of the markedly sensilliferous species, *G. Whitmani*. The result was that they corresponded exactly with that laid down in the table given above.

It would certainly seem to denote that, in this genus, the sensillæ mark off the first annulus of a somite. It is quite possible that there is no constancy in regard to the position occupied in a somite by the sensilliferous annuli in leeches in general, but it may be always the same in the same genus, as in *Glossiphonia*, for instance, where, no doubt, the sensilliferous annulus is the middle one of the triannulate somite. I have pointed out in a previous paper, in connection with the description of the genus *Semilageneta*, the impossibility of allotting the annuli in the manner suggested by Castle, for that genus.

That variation takes place among the sensillæ can be seen in *Glossiphonia heteroclita*, in which the eyes are usually situated on annuli 5, 7, 8, and at other times on annuli 6, 7, 8; and the eyes are really modified sensillæ, and have the same metameric significance.

EXPLANATION OF PLATES LVI.-LVIII.

Plate lvi.—*Pontobdella macrothela* Schmarda.

Fig. 1.—Ventral view.

Fig. 2.—Dorsal view.

Plate lvii.—*Pontobdella australiensis*, n.sp.

Fig. 1.—The body distended.

Fig. 2.—The body extended.

Plate lviii.—*Geobdella tristriata*, n.sp.

Fig. 1.—Dorsal view.

Fig. 2.—Ventral view.